

What is claimed is:

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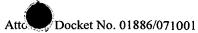
- 1. A set of chromosomal probes comprising any of the following combinations of two probes:
- (a) a 5p chromosome arm probe and a probe selected from the group consisting of a 8q24 locus specific probe, a 3q chromosome arm probe, a 20q chromosome arm probe, a 7p12 locus specific probe, a chromosome 16 enumeration probe, a chromosome 4 enumeration probe, a chromosome 12 enumeration probe, a chromosome 6 enumeration probe, and a 17q21 locus specific probe;
- (b) a 8q24 locus specific probe and a probe selected from the group consisting of a chromosome 17 enumeration probe, a chromosome 1 enumeration probe, and a chromosome 6 enumeration probe;
- (c) a 7p12 locus specific probe and a probe selected from the group consisting of a 3q chromosome arm probe and a chromosome 6 enumeration probe;
 - (d) a 3q chromosome arm probe and a chromosome 7 enumeration probe; or
 - (e) a chromosome 6 enumeration probe and a chromosome 7 enumeration probe.
- 2. The set of chromosomal probes of claim 1, wherein detection moieties are attached to the two probes.
- 3. The set of chromosomal probes of claim 2, wherein the detection moieties comprise fluorescent labels.
- 4. The set of chromosomal probes of claim 1, wherein the two probes are coupled to different detection moieties.
 - 5. The set of chromosomal probes of claim 4, wherein the detection moieties comprise fluorescent labels.
- 6. A set of chromosomal probes comprising any of the following combinations of three probes:
 - (a) a 5p15 locus specific probe, a 8q24 locus specific probe, and a probe selected from the group consisting of a 9p21 locus specific probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, a 7p12 locus specific probe, and a 17q21 locus specific probe;

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- (b) a 5p15 locus specific probe, a chromosome 12 enumeration probe, and a 9p21 locus specific probe;
- (c) a 8q24 locus specific probe, a chromosome 17 enumeration probe, and a 9p21 locus specific probe;
- (d) a 8q24 locus specific probe, a chromosome 1 enumeration probe, and a 9p21 locus specific probe; or
- (e) a 5p15 locus specific probe, a 3q chromosome arm probe, and a chromosome 12 enumeration probe.
- 7. A set of chromosomal probes comprising any of the following combinations of four probes:
- (a) a 5p15 locus specific probe, a chromosome 6 enumeration probe, a 17p13 locus specific probe, and a chromosome 17 enumeration probe;
- (b) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 1 enumeration probe, and a 7p12 locus specific probe;
- (c) a 5p15 locus specific probe, a 8q24 locus specific probe, a 3q chromosome arm probe, and a 7p12 locus specific probe;
- (d) a 5p15 locus specific probe, a 8q24 locus specific probe, a 20q chromosome arm probe, and a 7p12 locus specific probe;
- (e) a 5p15 locus specific probe, a 8q24 locus specific probe, a 7p12 locus specific probe, and a 17q21 locus specific probe;
- (f) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a 7p12 locus specific probe;
- (g) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a chromosome 1 enumeration probe;
- (h) a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a chromosome 12 enumeration probe;
- (i) a 5p15 locus specific probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, and a chromosome 12 enumeration probe;
- (j) a chromosome 7 enumeration probe, a chromosome 1 enumeration probe, a 30 chromosome 6 enumeration probe, and a chromosome 12 enumeration probe; or

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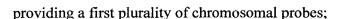
- (k) a 5p chromosome arm probe, a chromosome 1 enumeration probe, a chromosome 6 enumeration probe, and a chromosome 7 enumeration probe.
 - 8. A method of screening for lung cancer in a subject, the method comprising:
 - (a) obtaining a biological sample from the subject;
 - (b) obtaining the set of chromosomal probes of claim 1;
- (c) contacting the set of probes to the biological sample under conditions sufficient to enable hybridization of probes in the set to chromosomes in the sample, if any; and
- (d) detecting the hybridization pattern of the set of chromosomal probes to the biological sample to determine whether the subject has lung cancer.
- 9. The method of claim 8, wherein the biological sample comprises a bronchial specimen, a lung biopsy, or a sputum sample.
- 10. The method of claim 8, wherein the chromosomal probes are fluorescently labeled.
- 11. The method of claim 8, further comprising performing cytological analysis on the sample.
 - 12. A method of screening for lung cancer in a subject, the method comprising:
 - (a) obtaining a biological sample from the subject;
- (b) obtaining a chromosomal probe selected from the group consisting of a 5p15 locus specific probe, a chromosome 1 enumeration probe, a 7p12 locus specific probe, a 8q24 locus specific probe, and a chromosome 9 enumeration probe;
 - (c) contacting the chromosomal probe to the biological sample under conditions sufficient to enable hybridization of the probe to chromosomes in the sample, if any; and
- (d) detecting the hybridization pattern of the probe to the biological sample todetermine whether the subject has lung cancer.
 - 13. The method of claim 12, wherein the biological sample comprises a bronchial specimen, a lung biopsy, or a sputum sample.

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- 14. The method of claim 12, wherein the chromosomal probes are fluorescently labeled.
- 15. The method of claim 12, further comprising performing cytological analysis on the sample.
 - 16. A method of screening for lung cancer in a subject, the method comprising:
 - (a) obtaining a biological sample from the subject;
 - (b) obtaining the set of chromosomal probes of claim 6;
- (c) contacting the set of probes to the biological sample under conditions sufficient to enable hybridization of probes in the set to chromosomes in the sample, if any; and
- (d) detecting the hybridization pattern of the set of chromosomal probes to the biological sample to determine whether the subject has lung cancer.
 - 17. A method of screening for lung cancer in a subject, the method comprising:
 - (a) obtaining a biological sample from the subject;
 - (b) obtaining the set of chromosomal probes of claim 7;
- (c) contacting the set of probes to the biological sample under conditions sufficient to enable hybridization of probes in the set to chromosomes in the sample, if any; and
- (d) detecting the hybridization pattern of the set of chromosomal probes to the biological sample to determine whether the subject has lung cancer.
 - 18. The method of claim 17, wherein the set of chromosomal probes comprises a 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a 7p12 locus specific probe.
- 19. The method of claim 17, wherein the set of chromosomal probes consists of a
 5p15 locus specific probe, a 8q24 locus specific probe, a chromosome 6 enumeration probe, and a 7p12 locus specific probe.
 - 20. A method of selecting a combination of probes for the detection of cancer, the method comprising:

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determining the ability of each of the first plurality of probes to distinguish cancer specimens from normal specimens;

selecting those probes within the first plurality of probes that identify the cancer specimens as compared to the normal specimens to yield a second plurality of probes, wherein each probe within the second plurality of probes identifies the cancer specimens as compared to the normal specimens at a p value of less than 0.01 or a vector value of less than 0.500;

determining the ability of a combination of probes selected from the second plurality of probes to distinguish the cancer specimens from the normal specimens; and selecting a combination of probes that identifies the cancer specimen as compared to the normal specimen with a vector value of less than 0.400.